

Operating Substance Tank, especially for a
Portable Handheld Work Apparatus

Background of the Invention

5 United States Patent 5,896,669 discloses an operating substance tank for a portable handheld work apparatus, namely, for an overhead branch cutter. The tank is configured as one piece and has a fill opening for lubricating oil as well as a discharge opening for conducting the lubricating oil to a guide
10 bar having saw chain running along the periphery thereof. The operating substance tank is connected to an attachment flange for the guide bar. The operating substance tank includes a filter platelet as filter on its discharge opening for the lubricating oil conducted away by a piston pump. In operation, dirt
15 particles are carried into the tank housing when filling the operating substance tank and can lead to a clogging of the discharge opening because of the small filter area which is available.

Summary of the Invention

20 It is an object of the invention to improve an operating substance tank of the kind described above so that a cloggage of the discharge opening is prevented over a long service life and with a simple configuration.

25 The operating substance tank of the invention includes an operating substance tank for a portable handheld work apparatus. The operating substance tank includes: a tank housing having a tank interior and including a first housing part; and, a second housing part connected to the first housing part and defining the tank interior conjointly therewith; a filter wall configured as
30 one piece with one of the first and second housing parts; the

filter wall partitioning the tank housing into at least first and second spaces; and, the tank including a fill opening and an outflow connection through which the operating substance is drawn.

5 The operating substance tank is configured of a first housing part and a second housing part. With this configuration, it is possible to configure an internal filter wall on one of the housing parts so that the interior space of the tank is partitioned into two spaces, namely, a dirt or contamination
10 space and a clean space. The filter wall provides a large filter surface which cannot become clogged even after a long time of use.

 In a preferred embodiment, the filter wall is made up of lamellae having a gap between each two mutually adjacent ones of
15 the lamellae. The lamellae project out of a wall of one housing part in the direction of the other housing part and terminate preferably in a partition plane between the first and second housing parts. The lamellae lie with their free ends, which face away from the wall, against the second housing part. The cross
20 section of the lamellae is S-shaped or Z-shaped to improve the deposition of dirt thereon. With this constructive measure, dirt particles are better held back during the passage of the operating substance through the filter wall from the dirt space into the clean space. The fill opening is arranged on a wall of
25 the tank housing of the operating substance tank on the dirt space side and the discharge opening is arranged at the clean space side.

 It can be practical to configure the first housing part to have an L-shape when viewed in plan and to have a trough-shape
30 when viewed in cross section. The filter wall extends into the

tank interior space in an extension of an outer wall of the first housing part. The two housing parts of the operating substance tank are connected to each other with a solid material seal interposed on the partition surfaces of the housing parts. The solid material seal is preferably preformed as one piece. It can be practical to utilize a two-component sealing mass sprayed onto the partition surfaces of a housing part and set.

To minimize mechanical wear of the operating substance tank, the housing parts of the operating substance tank are preferably injection molded from a fiber-reinforced plastic having a correspondingly large wall thickness. The operating substance tank can, however, also be formed of a housing part of plastic and a housing part which is a part of an apparatus housing of a portable handheld work apparatus. If, for example, the operating substance tank functions to make available lubricating oil for a work tool of an overhead branch cutter, then it is practical to arrange the operating substance tank on the side of an attachment flange of the overhead branch cutter in order to obtain a minimized conveyance path to the work tool. This side of the attachment flange lies opposite to the work tool.

Brief Description of the Drawings

The invention will now be described with reference to the drawings wherein:

FIG. 1 is a perspective view of the operating substance tank according to the invention arranged on a portable handheld work apparatus;

FIG. 2 is a perspective view of the operating substance tank according to the invention arranged on the apparatus housing of the overhead branch cutter of FIG. 1;

FIG. 3 is a perspective view of a first housing part of the

operating substance tank;

FIG. 4 is a plan view of the first housing part of FIG. 3;
and,

FIG. 5 is a plan view of a second housing part configured as
an attachment flange of a work tool.

Description of the Preferred Embodiments of the Invention

The portable handheld work apparatus 2 of FIG. 1 functions
to cut branches from trees or the like and is herein referred to
as an overhead branch cutter 20. The portable handheld work
apparatus 2 is driven by a drive motor 24 at one end of a
telescopic rod 25. A work tool 23 is configured as a
cutterhead 26 in the embodiment shown and is mounted on an end of
the telescopic rod 25 opposite the drive motor 24 and is driven.
The work tool 23 comprises essentially an apparatus housing 21
having a guide bar 27 fixedly mounted thereon. A saw chain 28
runs on the periphery of the guide bar. An operating substance
tank 1 has a fill opening 3 and is mounted on the cutterhead 26
of the work apparatus 2 and functions, in the overhead branch
cutter shown, to store lubricating oil 29 for the saw chain 25.

FIGS. 2, 3 and 4 show the operating substance tank 1 in a
preferred embodiment on the apparatus housing 21 of a portable
handheld work apparatus 2 shown in FIG. 1. FIG. 2 is a
perspective view of the operating substance tank 1 according to
the invention and shows the operating substance tank arranged on
the apparatus housing 21, especially on the cutterhead 26. The
tank housing 5 of the operating substance tank 1 is formed of a
first housing part 6 and of a second housing part 7 connected to
the first housing part 6. The two housing parts (6, 7) are
connected to each other with threaded fasteners.

An inner filter wall 8 is formed on the wall 13 of the first

housing part 6 as one piece. The filter wall 8 has an edge 30 which faces away from the wall 13 of the first housing part 6 and ends in a partition plane 14 between the first and second housing parts. The filter wall 8 is formed of small rod-shaped lamellae 11 arranged approximately parallel to each other. A narrow gap 12 is formed between each two mutually adjacent ones of the lamellae. An operating substance 15 passes therethrough from a first space 9 (a dirt space) into a second space 10 (a clean space). As especially shown in a plan view of the interior of the first housing part 6 in FIG. 4, the lamellae 11 are configured to have an S-shape or Z-shape in cross section. During operation, the operating substance 15 is filled into the first space 9 of the tank housing 5 via the fill opening 3 and flows through the gaps 12 between the lamellae 11 into the second space 10. The operating substance is drawn off via a discharge opening 4 (see FIG. 5) from space 10 as required. An improved degree of deposition on the filter wall 8 is achieved with the S-shaped or Z-shaped cross-sectional form of the lamellae 11. This is so because the dirt particles can better separate and deposit on the lamellae 11 configured in such a way.

In the embodiment shown, the lamellae 11 are arranged in a plane in the interior of the first housing part 6 in an extension to a wall 16 of the first housing part 6. This constructive measure improves the pressure stiffness of the operating substance tank. The filter wall can be configured as one piece with the second housing part 7 in lieu of being configured as one piece with the first housing part 6.

As shown in FIG. 3, the housing parts of the operating substance tank are connected to each other with the interposition of a solid material seal 18 which comes to lie on the partition

surfaces 17 of the housing parts. The solid material seal 18 is preferably formed from a two-component sealing mass 19 which is sprayed onto a partition surface 17 and sets before the housing parts are connected each other (see FIG. 4). The housing parts can be connected to each other form tight, material tight or force tight so that, for example, a one piece operating substance tank is formed with a material tight connection of the two housing parts.

It is practical to form one or both housing parts of plastic, preferably fiber reinforced plastic. The wall thicknesses of the housing parts can be varied as desired in order to obtain a high mechanical resistance to load. Likewise, the filter wall 8 can, in lieu of lamellae 11, be made of a lattice or a perforated wall of the same material as the housing parts.

As shown in FIGS. 1, 2 and 5, the operating substance tank 1 is partially configured from the apparatus housing 21 (preferably an attachment flange 22) in a work apparatus 2 configured as an overhead branch cutter 20. In the embodiment shown, the second housing part 7 of the operating substance tank 1 is formed from the attachment flange 22 of the portable handheld work apparatus. The operating substance tank 1 is mounted on the side lying opposite the work tool 23 on the attachment flange 22 as shown in FIG. 1.

It is understood that the foregoing description is that of the preferred embodiments of the invention and that various changes and modifications may be made thereto without departing from the spirit and scope of the invention as defined in the appended claims.